

## THE BUTTERFLIES (LEPIDOPTERA) OF GARDEN AND ROTTNEST ISLANDS, WESTERN AUSTRALIA

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### Abstract

Fourteen species of butterflies are recorded from Garden I.: *Trapezites argenteornatus argenteornatus* (Hewitson), *Delias aganippe* (Donovan), *Pieris rapae rapae* (Linnaeus), *Danaus chrysippus petilia* (Stoll), *Geitoneura klugii insula* Burns, *Heteronympha merope duboulayi* (Butler), *Vanessa kershawi* (McCoy), *Vanessa itea* (Fabricius), *Junonia villida calybe* (Godart), *Jalmenus inous* Hewitson, *Candalides acastus* (Cox), *Nacaduba biocellata biocellata* (C. & R. Felder), *Theclinesthes miskini miskini* (T.P. Lucas) and *Zizina labradus labradus* (Godart). Four species are newly recorded from Rottneest I.: *Pieris r. rapae*, *Danaus c. petilia*, *Vanessa kershawi* and *Zizina l. labradus*. The butterfly faunas of Garden and Rottneest Is are compared.

### Introduction

Garden I. (32°12'S 115°40'E) is located 15 km SSW of Fremantle and is separated from the mainland by Cockburn Sound. The island, which is 9.5 km long and 2 km wide at its widest point, covers an area of approximately 1100 ha. At its southern end it is separated from the mainland by 2 km, now spanned by a causeway. It is derived from Pleistocene aeolianite (Tamala Limestone) and is covered by Holocene calcareous sand dunes (Brooker *et al.* 1992). The western side is exposed to harsh ocean weathering, whereas the eastern shoreline is well sheltered.

In 1829, the first settlers in Western Australia camped on Garden I. before moving to the mainland. At that time most of Garden I. seems to have been covered with *Callitris preissii* / *Melaleuca lanceolata* forest but by the 1950's *Acacia rostellifera* scrub over *Acanthocarpus preissii* had become the most widespread community (Ripley and Rowland 1995). Much of the island is still dominated by this association. *Melaleuca lanceolata* / *Callitris preissii* forest still remains but forms a less extensive component of the vegetation. Compared with the adjacent mainland the vegetation is relatively undisturbed, with fire excluded from large areas for many years. The Department of Defence is responsible for ongoing environmental management (Brooker *et al.* 1992).

Rottneest I. (32°00'S 115°30'E) lies 20 km NW of Garden I. and 18 km off shore. It is 11 km long, almost 5 km wide at its widest point and covers an area of 1900 ha. It has greater habitat variety than Garden I., the most striking difference being the presence of salt lakes and associated vegetation (Marchant and Abbott 1981). Ten species of butterfly have been recorded previously on Rottneest I. (Common and Waterhouse 1981, Dunn and Dunn 1991, Ripley and Rowland 1995).

Between January 1995 and May 1996 Garden I. was visited on a monthly basis and regular opportunistic observations made on the lepidopteran fauna during that time. Observations were made on a visit to Rottnest I. in November 1995. Voucher specimens are lodged in the Insect Collection of the Western Australian Department of Conservation and Land Management.

Table 1. Butterflies recorded from Garden and Rottnest Islands.

FAMILY	SPECIES	GARDEN	ROTTNEST
Hesperiidae	<i>Trapezites s. sciron</i>		•
	<i>T. a. argenteoornatus</i>	•*	•
	<i>Anisynta sphenosema</i>		•
	<i>Hesperilla donnysa albina</i>		•
	<i>H. c. chrysotricha</i>		•
Pieridae	<i>Delias aganippe</i>	•*	
	<i>Pieris r. rapae</i>	•*	•*
Nymphalidae	<i>Danaus p. plexippus</i>		•
	<i>D. chrysippus petilia</i>	•*	•*
	<i>Geitoneura klugii insula</i>	•*	•
	<i>Heteronympha merope duboulayi</i>	•*	
	<i>Vanessa kershawi</i>	•*	•*
	<i>V. cardui</i>		•
	<i>V. itea</i>	•*	•
	<i>Junonia villida</i>	•*	
Lycaenidae	<i>Jalmenus inous</i>	•*	
	<i>Candalides acastus</i>	•*	
	<i>Nacaduba biocellata</i>	•*	
	<i>Theclinesthes m. miskini</i>	•*	
	<i>T. s. serpentina</i>		•
	<i>Zizina l. labradus</i>	•*	•*
TOTALS	21	14	14

Note:- \* = new record.

### Observations on Garden Island

Species recorded on Garden I. are listed in Table 1.

#### HESPERIIDAE

*Trapezites argenteoornatus argenteoornatus* (Hewitson). Very common; adults first seen in early October but most abundant in November, with small numbers still present towards the end of December. Adults visited the flowers of *Senecio lautus*, *Trachymene coerulea*, *Asphodelus fistulosus*, *Scaevola crassifolia* and the introduced thistle *Carduus pycnocephalus*. Larvae were found on *Acanthocarpus preissii*. A fresh egg matched the description by Common and Waterhouse (1981) but was cream-white in colour. The ovum measured 1.0 mm in diameter, the first instar larva 2.5

mm in length. Its head is large and rounded, shiny black and finely pitted, with a few minute whitish hairs; the wide prothoracic plate is brownish-black and shiny. The body is cream, with indistinct reddish-brown dorsal and lateral stripes, becoming more pronounced towards the posterior end. The posterior segment had sparse long whitish setae.

#### PIERIDAE

*Delias aganippe* (Donovan). Generally uncommon; adults were observed from mid January to late April. Individuals were most frequently seen in *Melaleuca lanceolata* woodlands or circling high points at the northern end of the island. Grund (1996) recently recorded the mistletoe *Amyema melaleucae* (a parasite on *M. lanceolata*) as a larval foodplant; this may well explain the presence of *D. aganippe* on Garden I.

*Pieris rapae rapae* (Linnaeus). This may not be an established resident; one specimen was collected near Point Atwick firebreak in October 1995 and occasional specimens observed in November and December, near beaches at the northern end of the island. It is very common in the south-west of Western Australia wherever brassicas are grown and was first recorded in Perth in 1943 (Houston 1994).

#### NYMPHALIDAE

*Danaus chrysippus petilia* (Stoll). In February 1995 Cyclone Bobby brought widespread heavy rainfall across much of inland Western Australia. This preceded a massive buildup of butterflies on the mainland during March and April 1995 (Williams *et al.* 1996). On Garden I. numbers were very low in February but increased markedly during April and May. Between June 1995 and May 1996 no further individuals were seen.

*Geitoneura klugii insula* Burns. Abundant during spring and early summer 1995. Males appeared in late October, females in the second week of November. By mid December only females were seen. Adults were attracted to the flowers of *Trachymene coerulea*, *Carduus pycnocephalus* and *Scaevola crassifolia*. The larval foodplant is the tussock grass *Stipa flavescens* Labill. Larvae were located in early spring near the bases of tussocks where they tended to hide during the day. Fisher (1978) noted that in South Australia larvae of *G. k. klugii* (Guérin-Méneville) feed openly during the daytime and do not hide near the base of the foodplant. Mature larvae from Garden I. differed from those described by Fisher (1978), in having a yellowish rather than red tip to the bifid anal segment. Several grasses, including *Brachypodium distachyon*, *Poa tenera* and *Themeda australis*, have been recorded as larval foodplants for *G. k. klugii* (Fisher 1978). On the mainland near Wanneroo, north of Perth, I have also found larvae of *G. k. klugii* on perennial veldt grass *Ehrharta calycina* Smith.

*Heteronympha merope duboulayi* (Butler). In February 1996, a female was collected in open *Melaleuca lanceolata*/*Acacia rostellifera* woodland habitat

close to Atwick firebreak. The status of this butterfly is uncertain since only one specimen was encountered.

*Vanessa kershawi* (McCoy). Fairly common, with adults seen from September to January.

*Vanessa itea* (Fabricius). In January 1995 worn specimens were seen occasionally but none was recorded after this during the very hot late summer months. A single freshly emerged individual was seen in May, near the northern end of the island. The species was very common from late August to November, numbers diminishing rapidly in December. Adults frequently hill-topped above high dunes and fed on the flowers of *Trachymene coerulea*, *Westringia dampieri* and *Carduus pycnocephalus*. Two known foodplants, *Urtica urens* (Common and Waterhouse 1981) and *Parietaria debilis* (Powell 1993), are both present on Garden I. (McArthur and Bartle 1981). A few occupied larval shelters were found on nettles in July and by late August-September large numbers of shelters were present.

*Junonia villida calybe* (Godart). Around Perth, this species is reported to be less abundant than it used to be, but the reasons for its decline are unknown (Houston 1994). On Garden I. in 1995 the species was common, with adults most abundant from September to December and for a shorter period in May.

#### LYCAENIDAE

*Jalmenus inous* Hewitson. Three small colonies were located, one near the helicopter support facility at the southern end of the island, one close to the main road barrier north of the armaments jetty, and a third alongside Atwick firebreak. Several adults were seen near the well at the northern end of the island, suggesting that a breeding colony may be present at this site. Adults were active from October to December, flying around young *Acacia rostellifera* shrubs, the larval foodplant. Larvae and pupae were located at the bases of these shrubs where they were always attended by small black ants of the *Iridomyrmex rufoniger* species group.

*Candalides acastus* (Cox). Uncommon; a freshly emerged female was collected in a sheltered swale behind beach foredunes on the western side of the island near Gilbert Point.

*Nacaduba biocellata biocellata* (C. & R. Felder). Relatively uncommon, but abundant for a short time in February 1995 after a series of light summer showers. An influx was encountered for a short period in May 1996. It was seldom encountered at other times of the year.

*Theclinesthes miskini miskini* (T.P. Lucas). The main flying time was late November and December. It was present throughout the *Acacia rostellifera* woodlands at the northern end of the island and was also seen hill-topping on Buache Hill. One specimen was collected in February.

*Zizina labradus labradus* (Godart). Very uncommon; one freshly emerged individual encountered close to Atwick firebreak in December 1995.

### Observations on Rottnest Island

Species recorded on Rottnest I. are listed in Table 1. All observations were made during November, 1995.

### HESPERIIDAE

*Trapezites argenteornatus argenteornatus* (Hewitson). Recorded from September to December by Common and Waterhouse (1981). Abundant wherever the foodplant *Acanthocarpus preissii* was present, with adults attracted to the flowers of *Scaevola crassifolia*.

### PIERIDAE

*Pieris rapae rapae* (Linnaeus). Not previously recorded; observed feeding on flowering *Scaevola crassifolia* shrubs alongside Garden Lake.

### NYMPHALIDAE

*Danaus chrysippus petilia* (Stoll). Not seen; one individual was observed on the island in April 1995 (Vanda Longman, *pers. comm.*).

*Danaus plexippus plexippus* (Linnaeus). Several individuals were noted, most found in sheltered areas planted with *Eucalyptus gomphocephala*.

*Geitoneura klugii insula* Burns. Abundant, with large numbers feeding on the flowers of *Trachymene coerulea* and *Scaevola crassifolia*. *Stipa flavescens*, the larval foodplant on Garden I., is also widespread on Rottnest.

*Vanessa kershawi* (McCoy). A single specimen, tentatively identified as this species, was observed but not collected near Garden Lake.

### LYCAENIDAE

*Theclinesithes serpentata serpentata* (Herrich-Schaffer). Moderately common around margin of the salt lakes, with most individuals seen in areas sheltered from the wind.

*Zizina labradus labradus* (Godart). Several specimens were collected at the western end of the island, flying over low shrub ground-cover in sheltered swales and hollows.

### Discussion

Although Garden I. is relatively close to the mainland and is one of the most closely studied islands in Western Australia, nothing has been published previously on its butterfly fauna. Paradoxically, the lepidopteran fauna of Rottnest I. is comparatively well known, even though it lies considerably further (18 km) from the coast. Fourteen butterfly species are recorded from Garden I., the same number are known from Rottnest.

The similarity in overall butterfly species numbers for Rottnest and Garden Is is interesting given that Rottnest is some 600 ha larger than Garden

(excluding salt lakes), and has greater habitat diversity (Marchant and Abbott 1981). This similarity is also reflected in the native plant species occurring on the two islands, with Rottneest having only two species more than Garden I. Rottneest has 105 and Garden 103 species of native plants, 40 of these common to both islands (Marchant and Abbott 1981).

The species composition of Rottneest and Garden I. butterflies provides some interesting anomalies (Table 1). A combined total of 21 species has been recorded but only seven are common to both islands: *T. a. argenteoornatus*, *P. r. rapae*, *D. c. petilia*, *G. k. insula*, *V. kershawi*, *V. itea* and *Z. l. labradus*.

### HESPERIIDAE

Only one Skipper, *T. a. argenteoornatus*, was recorded on Garden I. This contrasts with Rottneest where five species have been recorded (Common and Waterhouse 1981, Dunn and Dunn 1991). Two of these, *Hesperilla donnysa albina* Waterhouse and *Hesperilla chrysotricha chrysotricha* (Meyrick & Lower), both require *Gahnia* species on which to breed. No *gahnias* have been recorded from Garden I. *Trapezites sciron sciron* Waterhouse & Lyell is also known from Rottneest, although no recent specimens have been collected. *Anisynta sphenosema* (Meyrick & Lower) is also recorded from Rottneest but was not encountered on Garden I. during the 1995/96 survey.

### LYCAENIDAE

Lycaenids are better represented on Garden I. (5 spp.) than on Rottneest (2 spp.). Only one, *Z. l. labradus*, was common to both. On Rottneest I. only *T. s. serpentata* (Herrich-Schaffer) had been recorded previously (Williams *et al.* 1993). It flies near the salt lakes where the saltbush *Atriplex cinerea* is almost certainly the foodplant. This habitat is absent from Garden I. In November 1995, *Z. l. labradus* was recorded at the extreme western end of Rottneest I. On Garden I. it is uncommon.

The presence of *J. inous* on Garden I. is significant because it represents the first known island population for this species. Specimens from Garden I. are morphologically similar to those from Singleton, a nearby mainland population which has drastically declined following clearing. In coastal areas around Perth and Mandurah and south to Bunbury, this species may be regarded as vulnerable due to increasing pressure from urban development; several local populations have been destroyed in recent years. The colonies on Garden I. therefore should be consciously protected.

*Cassythia glabella* is fairly plentiful on Garden I. and is a known foodplant for *C. acastus* in Queensland and South Australia (Common and Waterhouse 1981). However, despite careful searching, no sign of any *Candalides* species was found until March 1996, when a freshly emerged female *C. acastus* was taken on the western side of the island. Around Perth, *C. acastus* flies in spring and early summer; its appearance on Garden I. at the beginning of autumn is surprising and further investigation is needed to

confirm whether mainland and island populations fly at different times of the year. No *Ogyris* species was encountered either on Garden or Rottnest Is, although a mistletoe, *Amyema melaleucaea*, is known from Garden I. (McArthur and Bartle 1981) and this could be a suitable foodplant for *Ogyris amaryllis meridionalis* Bethune-Baker. On exposed limestone surfaces along the western side of Garden I., *Leptomieria preissiana*, a known foodplant of *Ogyris otanes* C. & R. Felder, is fairly plentiful but the *Camponotus* ant species required by its larvae was not present.

#### PIERIDAE

The whites *D. aganippe* and *P. r. rapae* are both recorded from Garden I. On Rottnest I. *P. r. rapae* was observed on flowering *Scaevola crassifolia* near Garden Lake in November 1995. The species had been seen previously on Rottnest and has probably become established there around the main settlement (R.J. Powell, *pers. comm.*).

#### NYMPHALIDAE

Nymphalid butterflies are present on both islands and the assemblages are very similar. On Rottnest a vagrant *D. c. petilia* was seen in April 1995 (Vanda Longman, *pers. comm.*). At that time the species was particularly abundant on the mainland and Garden I. *D. p. plexippus* was not seen on Garden I. in 1995/96, but is an established resident on Rottnest where it breeds on the introduced *Gomphocarpus fruticosus* (Rippey and Rowland 1995). It has been seen or collected on a number of occasions during spring and summer.

*G. k. insula* is abundant on both Garden and Rottnest Is. Dunn and Dunn (1991) have pointed out that some *G. k. klugii* specimens from coastal Western Australia are similar in appearance to *G. k. insula* and suggest that a reappraisal of the status of *G. k. insula* may be needed. Specimens of *G. klugii* from Garden I. are indistinguishable from *G. k. insula* from Rottnest and are assigned to that subspecies. It would be interesting to know whether mature *G. k. insula* larvae from Rottnest I. and *G. k. klugii* larvae from mainland Western Australia have a yellowish bifid anal segment similar to the Garden I. larvae, or a red tipped bifid anal segment as described by Fisher (1978) for South Australian *G. k. klugii*. *H. m. duboulayi* was not seen on Garden I. during 1995 but one worn female was collected in March 1996, possibly a vagrant from the mainland.

*V. kershawi* is fairly common on Garden I. and is also resident on Rottnest where it apparently occurs only in low numbers (R.J. Powell, *pers. comm.*). Although *J. v. calybe* is very common on Garden I., it appears to be absent from Rottnest. This species is a strong flier and known migrant and could likely fly to Rottnest Island from the mainland. It is established on Bernier Island, 50 km west of Carnarvon (Williams and Hall 1993). *V. itea* is common on both Rottnest and Garden Is where the same foodplants are available. *Vanessa cardui* (Linnaeus) has been recorded from Rottnest I.

(Common and Waterhouse 1981) but has not been observed there for several years.

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